The mindset of the R&D professional

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Appendix D: Coding scheme, Chapter 4

Code	Dimension	Definition	Questions asked during data analysis
OIB	Open innovation behavior	All actions taken to conduct open innovation	Does this person engage in open innovation?
I	Intention	"Individual's willingness to try enacting a given behavior" (Ajzen, 2002, p. 118)	Is this person willing to engage in open innovation? Are there any plans of action to conduct open innovation?
ATT POS NEG	Attitude Positive Negative	"A person's overall evaluation of performing the behavior in question" (Ajzen, 2002, p. 5)	Which are the positive beliefs? Which are the negative beliefs? (Evaluate list of BBs)
BB	Behavioral belief	Beliefs about the outcome of engaging in the behavior "Provides the cognitive and affective foundations for attitudes" (Ajzen, 2002, p. 7)	Make a list of beliefs
SN	Subjective Norm	"Person's perception of social pressure to perform or not perform the behavior" (Ajzen, 2005, p. 118)	Who are relevant others? Do they favor or not favor the behavior? (Evaluate list of NBs)
NB S N NS	Normative beliefs Supportive Neutral Not supportive	"Beliefs that underlie subjective norm" (Ajzen, 2005, p. 124)	Make a list of beliefs
PBC IF EF	Perceived behavioral control Inhibiting/disabling factors Enabling factors	"People's confidence that they are capable of performing the behavior under investigation" (Ajzen, 2002, p. 6)	What are the enabling factors? What are the inhibiting factors? (Evaluate list of CBs)
CB	Control Beliefs	"Beliefs about the presence or absence of factors that facilitate or impede the performance of the behavior" (Ajzen, 2002, p. 125)	Make a list of beliefs

Appendix E: Coding process, Chapter 4

Four rounds of coding were conducted to establish the individual predictors of the intention to participate in open innovation—behavioral beliefs and attitudes, normative beliefs and subjective norm, and control beliefs and behavioral control. The first round of coding established a record (first order codes) of all the behavioral beliefs, the normative beliefs, and the control beliefs, as measured on the individual level. (Examples of beliefs are shown in the left column of Table E1). Next, the beliefs were evaluated to determine if the respondents considered the behavioral beliefs to be positive or negative, if the subjective norm favored or disfavored the behavior, and if the (perceived) behavioral control was inhibiting or enabling. The result of this first round was a list of individual beliefs and individual open innovation behaviors and intentions at the individual and the project levels.

Second, the first order codes were organized into categories after five interviews had been coded. These categories were revised based on the next five interviews, and so forth. In this round, we consulted the literature to form broad categories and improve their clarity. After 15 interviews, the categories were no longer changed, as shown in the middle column of Table E1. There were nine categories of behavioral beliefs, seven of the normative beliefs, and nine of the control beliefs.

Third, concepts were formed based on the categories, corresponding to axial coding, as shown in the right column of Table E1. The normative beliefs included three concepts: personal openness to open innovation, stereotyping, and attachment style. The normative referents comprised two groups: actors from inside and outside the firm. The control beliefs included three concepts: support, team composition and professional competencies, and environmental munificence or hostility.

The fourth round aimed to identify the attitudes, subjective norms, and (perceived) behavioral control (see Appendix F for an explanation).

Table E1

Behavioral beliefs, normative beliefs, and control beliefs about open innovation

Codes (1st order coding)	Categories (2nd order coding)	Concepts (axial coding)
Behavioral beliefs		
• Open innovation may lead to great success if organized correctly • Open innovation does not work in practice	Beliefs about efficacy of open innovation	Personal openness to open innovation
• Open-up is a failed project • Open-up is a good approach	Beliefs about efficacy of open innovation implementation	
• It is fun to start Open-up • If you want it, you can make it happen	Intrinsic motivation to engage in open innovation	
• Open innovation is a good way to learn what is going on with the client and end user • Magnus protects knowledge	Openness to external knowledge	
• Smaller partner and Magnus lack common goal • Smaller partner and Magnus have different product and profit cycles	Beliefs about diversity	Stereotyping
• SMEs can adjust quickly to the client • Magnus collaborates to get subsidies	Beliefs about ingroup	
• Collaboration is useful because SMEs know the market • Magnus adjusts slowly to the client	Beliefs about outgroup	
• We do not want to be dependent on partners • As an SME, it is important to position yourself correctly to be equal to the big partner	Dependency	Attachment style
• SMEs take advantage • Manager treats us as equal	Fairness	
Normative beliefs		
• Opinions of operational manager and open innovation manager are important • R&D manager supports initiative	Open-up initiators	Inside firm
• Other managers want to focus on core activities • Magnus does not support innovation	Other managers	
• Engineers and technicians like to collaborate • Engineers and technicians are not supportive/entrepreneurial	Engineers and technicians	

Table E1 continued

Behavioral beliefs, normative beliefs, and control beliefs about open innovation

Codes (1st order coding)	Categories (2nd order coding)	Concepts (axial coding)
• Experts think open innovation is important and have made similar experiences • Other firms want to have access to Magnus' knowledge	Experts	Outside firm
• Other good networks show successful examples	Other firms	
• Collaboration between SMEs and MNEs is a trend • Maybe we were ahead of time	Trend/ zeitgeist	
• Partner does not want to use our technology • Partners want to separate development	Clients and partners	
Control beliefs		
• Management does not make room for collaboration • Costumer unit managers cancel meeting	Organizational support	Support
• Subsidies help to develop open innovation • Collaboration was maintained because project was subsidized	Government	
• Openness is restricted by bureaucracy and processes • Different time horizons and scales between SMEs and Magnus	Organizational processes	
• You have to be proactive, entrepreneurial, and willing to take risks • There is a lack of entrepreneurs among technical staff	Entrepreneurial skills	Team composition and professional competencies
• Important to think about money early in the process; Magnus does not do that • Magnus' sales organization is not organized effectively	Sales skills	
• HR and business unit heads do not allow hiring new people • We are too small to think about further stages in project	Team composition	
• Interpersonal problems in team • We do not have good feelings about Magnus' engineers	Conflict management	
• R&D as a motor for prototype is closed • Lack of time and attention	Availability of resources	Environmental munificence or hostility
• Lack of commitment of potential partners • Open innovation needs several founding partners	Availability of partners	

Appendix F: Calculation of behavioral attitudes, subjective norms, and (perceived) behavioral control on the project level, Chapter 4

This section describes the process for deriving the group scores from individuals' beliefs, using the example of behavioral attitudes. The same process was used for subjective norm and (perceived) behavioral control (see Tables F1, F2, and F3).

As shown in Table F1, the respondents' behavioral beliefs and attitudes towards open innovation were organized into three main concepts: personal openness to open innovation, stereotyping of their partners and their own firm, and attachment style related to external partners. Each concept was operationalized into a set of belief categories. Next, we used focused coding to identify the respondent's attitude towards open innovation and to aggregate those findings to the group level. The focused coding quantified the settings (interviews and meetings) in which positive and negative behavioral beliefs were recorded (columns 3 and 4). The negative beliefs were subtracted from the positive beliefs (column 5). If the result was smaller than minus one, the attitude was categorized as negative; if the difference was larger than one, the attitude was categorized as positive; and differences between minus one and plus one were categorized as mixed (column 6). Finally, the attitudes in each behavioral belief category were categorized into a total attitude for that concept (column 7). When the more attitudes by category were positive, the total attitude was considered positive, and when more attitudes were negative, the total attitude was negative. When the attitudes by category were equally negative and positive, the total was considered mixed. This process was repeated for the perceived behavioral beliefs and the control beliefs.

Table F1

Individual behavioral beliefs, individual attitudes, and project attitudes towards open innovation behavior

Concept	Behavioral belief category	Quantity (Individual level)			Attitude (Project level)	Total attitude (Project level)
		+[a]	-[b]	Δ[c]		
Personal openness to open innovation	Beliefs about efficacy of open innovation	6	9	-3	Negative	Mixed
	Beliefs about efficacy of open innovation implementation	5	9	-4	Negative	
	Intrinsic motivation to engage in open innovation	9	1	7	Positive	
	Openness to external knowledge	7	1	6	Positive	
Stereotyping	Beliefs about diversity	-	5	-5	Negative	Negative
	Beliefs about ingroup	1	2	1	Mixed	
	Beliefs about outgroup	3	4	1	Mixed	
Attachment style	Dependency	2	5	-3	Negative	Negative
	Fairness	1	6	-5	Negative	

[a] Positive belief
[b] Negative belief
[c] Difference between negative and positive belief

Table F2

Individual normative beliefs regarding open innovation, individual subjective norm, and project subjective norm

Concept	Actors	Quantity (Individual level)			Subjective norm (Project level)	Total subjective norm (Project level)
		Approval	Disapproval	Δ[c]		
Inside firm	Open Up initiators	4	-	4	Supportive	Mixed
	Other Managers	3	6	-3	Not supportive	
	Technicians	2	2	0	Neutral	
Outside firm	Experts	1	-	1	Supportive	Supportive
	Other firms	2	-	2	Supportive	
	Trend	3	1	2	Supportive	
	Clients and partners	2	3	-1	Not supportive	

[c] Difference between approving and disapproving individuals

Table F3
Individual control beliefs, individual perceived behavioral control, and project behavioral control

Concept	**Behavioral belief category**	**Quantity (Individual level)**			**Behavioral control (Project level)**	**Total behavioral control (Project level)**
		+[a]	-[b]	Δ[c]		
Organizational support	Managerial commitment	6	8	-2	Disabling	Disabling
	Government support	4	-	4	Enabling	
	Organizational processes	4	9	-5	Disabling	
Team composition and professional competencies	Entrepreneurial skills	2	5	-3	Disabling	Disabling
	Sales skills	-	8	-8	Disabling	
	Team composition	1	4	-3	Disabling	
	Conflict management	2	7	-5	Disabling	
Environmental munificence or hostility	Availability of resources	4	9	-5	Disabling	Disabling
	Availability of partners	-	6	-6	Disabling	

[a] Positive belief
[b] Negative belief
[c] Difference between negative and positive belief